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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/732,243	12/07/2000	Steven James Frisken	U013097-8	9498

140 7590 01/05/2006

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EXAMINER	
LAVARIAS, ARNEL C	

ART UNIT	PAPER NUMBER
2872	

DATE MAILED: 01/05/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/732,243	FRISKEN ET AL.	
	Examiner	Art Unit	
	Arnel C. Lavarias	2872	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *04 April 2005*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-5 and 7-22* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-5 and 7-22* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *07 December 2000* is/are: a)☐ accepted or b)☒ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Response to Amendment

1. The amendments to Claims 1, 3-4, 7, 13, 19, 21-22 in the submission dated 4/4/05 are acknowledged and accepted.

Response to Arguments

2. The Applicants argue that, by way of amendment in accordance with the provisions of 35 U.S.C. 112, 6th paragraph, Claims 1, 7, 13, 19, 21-22 now cover the corresponding structure, material, or acts described in the instant disclosure and equivalents thereof, and hence do not require the recital of additional structure, material, or acts. After reviewing the amendments made to Claims 1, 7, 13, 19, 21-22, the Examiner agrees, and respectfully withdraws the rejections in Sections 1-2 of the Office Action dated 11/3/04.

3. The Applicants argue that, with respect to newly amended Claims 1, 7, 13, 19, 21-22, Cao fails to teach or reasonably suggest optical devices and methods, substantially as claimed in Claims 1, 7, 13, 19, 21-22, the devices the methods including reflective optical circuit means arranged such that two rotated polarization component signals are re-combined by way of the birefringent element to form an output optical signal for transmission in a reverse direction along the first transmission path. After reviewing Cao, the Examiner agrees, and respectfully withdraws the rejections in Sections 3-5 of the Office Action dated 11/3/05.

4. Claims 1-5, 7-22 are now rejected as follows.

Drawings

5. The originally filed drawings were received on 12/7/00. These drawings are objected to for the following reason(s) as set forth below.

6. The drawings are objected to as failing to comply with 37 CFR 1.84(p)(5) because they do not include the following reference sign(s) mentioned in the description:
Figure 4- Reference numerals 25, 26, 27 (See Page 4, lines 10-11).
Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

7. The drawings are objected to because of the following informalities:
Figure 1- reference label '1' should read '4'.
Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be

canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Specification

8. Applicant is reminded of the proper language and format for an abstract of the disclosure.

The abstract should be in narrative form and generally limited to a single paragraph on a separate sheet within the range of 50 to 150 words. It is important that the abstract not exceed 150 words in length since the space provided for the abstract on the computer tape used by the printer is limited. *The form and legal phraseology often used in patent claims, such as "means" and "said," should be avoided.* The abstract should describe the disclosure sufficiently to assist readers in deciding whether there is a need for consulting the full patent text for details.

The language should be clear and concise and should not repeat information given in the title. It should avoid using phrases which can be implied, such as, "The disclosure concerns," "The disclosure defined by this invention," "The disclosure describes," etc.

9. The abstract of the disclosure is objected to because of the following informalities:

Improper legal phraseology in the abstract- See particularly Abstract, lines 2 ("comprising:") and 3 ("means").

Correction is required. See MPEP § 608.01(b).

10. The disclosure is objected to because of the following informalities:

Page 2, line 10- 'an' should read 'a'

Page 4, line 7- 'lens 22' should read 'lens 14'.

Appropriate correction is required.

Claim Objections

11. Claims 14, 17, 21 are objected to because of the following informalities:

Regarding Claims 14 and 17, the phrase "...and other components, including a lens and a reflective element..." renders the claim(s) indefinite because the claim(s) include(s) elements not actually disclosed, thereby rendering the scope of the claim(s) unascertainable. See MPEP § 2173.05(d). For purposes of examination, 'other components' has been taken to mean specifically a lens and a reflective element.

Claim 14, lines 6-7- it is not clear what the limitation '...the single birefringent element and other components having fit}...' refers to. For purposes of examination, 'fit}' has not been given any significant patentable weight.

Claim 17, line 5- 'direction.' should read 'direction,'

Claim 21, line 7- 'the a single' should read 'the single'

Appropriate correction is required.

Claim Rejections - 35 USC § 102

12. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.
(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

13. Claim 19 is rejected under 35 U.S.C. 102(e) as being anticipated by Fukushima et al. (U.S. Patent No. 6018411).

Fukushima et al. discloses an optical device (See for example Figures 8-9) for producing a polarization rotation of an optical signal (See 64 in Figures 8-9), the device comprising a single birefringent element (See 82 in Figures 8-9) for, in use, splitting the optical signal into two orthogonal polarization component signals; a polarization rotating means (See 58 in Figures 8-9) for, in use, rotating each polarization component signal by a predetermined amount, and wherein the device is arranged in a manner such that, in use, the two polarization component signals follow substantially the same paths in opposite directions through the polarization rotating means (See light paths in 58, 56 in Figures 8-9) and are combined (See 70, 66 in Figures 8-9) by way of the birefringent element to produce the predetermined polarization rotated optical signal.

14. Claims 1-2, 7-8, 13, 15-16, 18-19, 21-22 are rejected under 35 U.S.C. 102(b) as being anticipated by Erickson (U.S. Patent No. 4441186).

Erickson discloses an optical device (See for example Figures 1, 3-5) for producing a polarization rotation of an input optical signal (See 14 in Figure 1) received by the device along a first transmission path in a forward direction, and an optical telecommunications system including the optical device, the device comprising a single birefringent element

(See 19 in Figure 1) for, in use, splitting the input optical signal into two orthogonal polarization component signals; a polarization rotating means (See 20 in Figure 1) for, in use, rotating each polarization component signal by a predetermined amount, and a reflective optical circuit means (See for example 19, 20, 16 in Figure 1) arranged, in use, such that the two rotated polarization component signals are re-combined by way of the birefringent element to form an output optical signal for transmission in a reverse direction along the first transmission path. Erickson also discloses a method (See for example Figures 1, 3-5) for producing a predetermined polarization rotation of a received optical signal propagating in a forward direction along a first transmission path, the method comprising the steps of splitting (See 19 in Figure 1) the received optical signal into two orthogonal polarization component signals utilizing a signal birefringent element; rotating (See 20 in Figure 1) each polarization component signal by nominally predetermined polarization rotation utilizing a polarization rotation means; and redirecting (See for example 19, 20, 16 in Figure 1) each polarization component through the signal birefringent element to thereby combine the two rotated polarization component signals utilizing the birefringent element to form a transmitted optical signal propagating in a reverse direction along the first transmission path.

Further, Erickson discloses an optical device (See for example Figures 1, 3-5) for producing a polarization rotation of an optical signal (See 14 in Figure 1), and an optical telecommunications system including the optical device, the device comprising a single birefringent element (See 19 in Figure 1) for, in use, splitting the optical signal into two orthogonal polarization component signals; a polarization rotating means (See 20 in

Figure 1) for, in use, rotating each polarization component signal by a predetermined amount, and wherein the device is arranged in a manner such that, in use, the two polarization component signals follow substantially the same paths in opposite directions through the polarization rotating means (See light paths in 20, 16 in Figure 1) and are combined (See 19 in Figure 1) by way of the birefringent element to produce the predetermined polarization rotated optical signal. Erickson additionally discloses a method (See for example Figures 1, 3-5) for producing a predetermined polarization rotation of an optical signal, the method comprising the steps of splitting (See 19 in Figure 1) the optical signal into two orthogonal polarization component signals utilizing a single birefringent element; rotating (See 20 in Figure 1) each polarization component signal by nominally predetermined polarization rotation utilizing a polarization rotation means; and redirecting (See 16, 19 in Figure 1) each polarization component through the single birefringent element to recombine the two polarization component signals rotated in the previous steps into a polarization rotated optical signal utilizing the birefringent element, wherein in the previous step, the optical signal is transmitted to and enters the single birefringent element along a first path, and the polarization rotated signal exits the single birefringent element along the same first path.

Erickson additionally discloses the polarization rotation being 90 degrees (See col. 2, line 60-col. 3, line 14); and the optical device comprises an optical circuit comprising the single birefringent element, the polarization rotating means and a reflective element (See 19, 20, 16 in Figure 1), the two orthogonal polarization component signals being transmitted from the polarization rotating means to the reflective element in a first

direction and back to the polarization rotating means in an opposite direction, with a relative displacement of the two orthogonal component signals without being displaced with respect to one another in the first direction being the same as a relative displacement of the two orthogonal component signals in the opposite direction (See 14, 22, 24 in Figure 1).

Claim Rejections - 35 USC § 103

15. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

16. Claims 5 and 11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Erickson.

Erickson discloses the invention as set forth above in Claims 1 and 7, except for the birefringent element comprising rutile. However, it would have been obvious to one having ordinary skill in the art at the time the invention was made to have the birefringent element comprise rutile, since it has been held to be within the ordinary skill of worker in the art to select a known material on the basis of its suitability for the intended use. One would have been motivated to have the birefringent element comprise rutile to take advantage of its wide availability and its very large birefringence, which allows thinner, lighter elements to be utilized to produce the same birefringence effects. *Sinclair & Carroll Co. v. Interchemical Corp., 325 U.S. 327, 65 USPQ 297 (1945).*

17. Claims 1-5, 7-18, 20-22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Fukushima et al.

Fukushima et al. discloses an optical device (See for example Figures 8-9) for producing a polarization rotation of an input optical signal (See 64 in Figures 8-9) received by the device along a first transmission path in a forward direction, and an optical telecommunications system including the optical device, the device comprising a single birefringent element (See 82 in Figures 8-9) for, in use, splitting the input optical signal into two orthogonal polarization component signals; a polarization rotating means (See 58 in Figures 8-9) for, in use, rotating each polarization component signal by a predetermined amount, and a reflective optical circuit means (See 70, 82, 58, 56 in Figures 8-9) arranged, in use, such that the two rotated polarization component signals are re-combined by way of the birefringent element to form an output optical signal for transmission in a reverse direction parallel to the first transmission path (See 64, 66 in Figures 8-9). Fukushima et al. also discloses a method (See for example Figures 8-9) for producing a predetermined polarization rotation of a received optical signal (See 64 in Figures 8-9) propagating in a forward direction along a first transmission path, the method comprising the steps of splitting (See 82 in Figures 8-9) the received optical signal into two orthogonal polarization component signals utilizing a signal birefringent element; rotating (See 58 in Figures 8-9) each polarization component signal by nominally predetermined polarization rotation utilizing a polarization rotation means; and redirecting (See 70, 82, 58, 56 in Figures 8-9) each polarization component through the signal birefringent element to thereby combine the two rotated polarization component

signals utilizing the birefringent element to form a transmitted optical signal propagating in a reverse direction parallel to the first transmission path.

Further, Fukushima et al. discloses an optical telecommunications system including an optical device (See for example Figures 8-9) for producing a polarization rotation of an input optical signal (See 64 in Figures 8-9) to generate an output optical signal (See 66 in Figures 8-9) transmitted by the system, the device comprising a single birefringent element (See 82 in Figures 8-9) for, in use, splitting the optical signal into two orthogonal polarization component signals; a polarization rotating means (See 58 in Figures 8-9) for, in use, rotating each polarization component signal by a predetermined amount, and wherein the device is arranged in a manner such that, in use, the two rotated polarization component signals are combined by way of the birefringent element to form the output signal having the predetermined polarization rotation, the output signal being transmitted back into the system along a path in a reverse direction parallel to the input optical signal (See 64, 66, 70, 82 in Figures 8-9). Fukushima et al. additionally discloses a method (See for example Figures 8-9) for producing a predetermined polarization rotation of an optical signal, the method comprising the steps of splitting (See 82 in Figures 8-9) the optical signal into two orthogonal polarization component signals utilizing a single birefringent element; rotating (See 58 in Figures 8-9) each polarization component signal by nominally predetermined polarization rotation utilizing a polarization rotation means; and redirecting (See 70, 82, 58, 56 in Figures 8-9) each polarization component through the single birefringent element to recombine the two polarization component signals rotated in the previous steps into a polarization rotated optical signal utilizing the

birefringent element, wherein in the previous step, the optical signal is transmitted to and enters the single birefringent element along a first path, and the polarization rotated signal exits the single birefringent element along a path in a reverse direction parallel to the first path.

Fukushima et al. additionally discloses the polarization rotation being 90 degrees (See for example col. 10, lines 28-37); the polarization rotating means comprising a nominally 45 degrees Faraday rotator and wherein the optical circuit means is arranged in a manner such that, in use, the polarization component signals are transmitted twice through the nominally 45 degree Faraday rotator (See 58 in Figures 8-9; Figure 1; col. 3, lines 11-35); the optical circuit means comprises a lens (See 70 in Figures 8-9) and a reflective element (See 56 in Figures 8-9) for reflecting the polarization component signals for transmission back through the 45 degree Faraday rotator; coupling the optical signal into the device from a first optical fiber, and coupling the rotated optical signal back into a second optical fiber parallel to the first optical fiber (See 64, 66 in Figures 8-9); the optical device comprising an optical circuit comprising a first path wherein the two orthogonal component signals are transmitted in a first direction and a return path wherein the two orthogonal component signals are transmitted in an opposite direction, the optical circuit consisting of the single birefringent element, the polarization rotating means, a lens, and a reflective element, the single birefringent element, lens and reflective element having an affect on a relative displacement of the two orthogonal polarization component signals with respect to one another that is the same in the first and opposite directions at any point along the first and return paths (See light traversing 64, 66, 70, 82, 58, 56 in Figures

8-9); the optical device comprises an optical circuit comprising the single birefringent element, the polarization rotating means and a reflective element (See 82, 58, 56 in Figures 8-9), the two orthogonal polarization component signals being transmitted from the polarization rotating means to the reflective element in a first direction and back to the polarization rotating means in an opposite direction, with a relative displacement of the two orthogonal component signals without being displaced with respect to one another in the first direction being the same as a relative displacement of the two orthogonal component signals in the opposite direction (See light traversing 64, 66, 70, 82, 58, 56 in Figures 8-9); the two orthogonal polarization component signals are transmitted from the polarization rotating means to a reflective element in a first direction and back to the polarization rotating means in an opposite direction with a relative displacement of the two orthogonal component signals without being displaced with respect to one another being the same in the first and opposite directions (See light traversing 64, 66, 70, 82, 58, 56 in Figures 8-9); and the birefringent element comprising rutile (See col. 8, line 58-col. 9, line 6).

Fukushima et al. discloses the invention as set forth above, except for the reverse direction being along the first transmission path. However, Fukushima et al. further teaches a second embodiment (See Figure 6; col. 5, lines 46-65; col. 6, line 64-col. 8, line 14; col. 8, line 58-col. 11, line 8) that may be utilized with the above disclosed invention. In particular, Fukushima et al. teaches that the angular separation between the incident and reflected light beams may range from 0 to 5 degrees, and that for the case where the angular separation is specifically zero degrees, the incident and reflected light beams will

coincide with each other. In this case, the use of a circulator is needed to spatially separate the incident beam from the reflected beam (See col. 5, lines 46-65; IB, RB in Figure 6). The incident and reflected beams coincide at the input to the optical device, such that the reflected light transmission path is in a reverse direction along the incident transmission path. Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to have the reverse direction be along the first transmission path, as taught in a secondary embodiment of Fukushima et al., in the devices and methods of Fukushima et al., to allow for reduction in size of various elements in the device, including the reflector, Faraday rotator crystal and its associated permanent magnet or electromagnet, and reduction in power consumption due to reduction in electromagnet size.

Conclusion

18. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

U.S. Patent No. 4941738 to Olsson.

Olsson is being cited to evidence a conventional Faraday rotator mirror device (See for example 18, 16 in Figure 1), similar to that disclosed in Figure 1 of Applicants' disclosure. However, as with Figure 1 of Applicants' disclosure, Olsson lacks a single birefringent element for splitting the input optical signal into two orthogonal polarization component signals.

19. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

20. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Arnel C. Lavarias whose telephone number is 571-272-2315. The examiner can normally be reached on M-F 9:30 AM - 6 PM EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Drew Dunn can be reached on 571-272-2312. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Amel C. Lavarias

Amel C. Lavarias
Patent Examiner
Group Art Unit 2872
12/28/05